

REMARKS/ARGUMENTS

With the entry of the present amendments, Claims 1-17, 34 and 35 are pending in this application. Claims 1 and 9 have been amended. Support for the amendments to Claims 1 and 9 is discussed in Section I, below.

I. Rejection of Independent Claims 1 and 9 Under 35 U.S.C. § 103(a)

Independent claim 1 stands rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent Application Publication No. 2002/0110932 ("Wagner") in view of U.S. Patent Application Publication No. 2002/0128234 ("Hubbell") and U.S. Patent No. 4,822,681 ("Schössler"). Independent Claim 9 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Wagner in view of Hubbell and Schössler and further in view of PCT Application Publication No. WO 01/83826 ("Laibinis"), U.S. Patent No. 2,559,986 ("Musser") and the MSDS for epichlorohydrin.

Although the Examiner acknowledges that Wagner "fails to teach a step of reacting a first gas comprising epoxy-functional molecules with surface hydroxyl groups in situ in the absence of plasma," (Office Action, p. 7) the Examiner maintains that "it would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to employ a method of reacting a gas comprising spacer molecules with epoxy functional groups with the surface hydroxyl groups of Wagner et al. in view of Hubbell et al. and Schössler et al. in situ in the absence of plasma since Schössler et al. teaches that activation in gaseous phase through the employment of underpressure provides and activation technique, which has lower expenditure compared to other activation techniques." (Office Action p. 9.) With respect to claim 9, the Examiner further asserts that "one of ordinary skill in the art would have had a reasonable expectation of success in performing the reaction of epichlorohydrin in a gaseous phase as Musser teaches a method of reacting hydroxyl with epichlorohydrin in gaseous phase." (Office Action, p. 12.) Finally, the Examiner notes that "it is well-known in the art that epichlorohydrin molecules can interact with hydroxyl radicals when exposed to air and results in the degradation as evidenced by the Material Safety Data Sheet (MSDS) for epichlorohydrin." (Office Action, p. 11.) Applicants respectfully traverse.

As a preliminary matter, Applicants note that claims 1 and 9 have been amended to explicitly recite an inherent feature of the claimed methods, namely that the epoxy groups on the gas-phase epoxy-functional molecules react with the surface hydroxyl groups in the

absence of acid and base catalysts. The addition of this exclusionary proviso to claims 1 and 9 does not introduce new matter into the application.

Any negative limitation or exclusionary proviso must have basis in the original disclosure. However, a lack of literal basis in the specification may not be sufficient to establish a *prima facie* case for lack of descriptive support. See MPEP 2173.05(i), relying on *Ex parte Parks*, 30 USPQ2d 1234, 1236 (Bd. Pat. App. & Inter. 1993). The fundamental factual inquiry is whether the specification conveys with reasonable clarity to those skilled in the art that, as of the filing date sought, the applicants were in possession of the invention as claimed. See MPEP 2163 I.B.V. The facts of the present case are analogous to those in *Ex parte Parks*. Therefore, it is clear that the present amendments are supported by the specification.

In *Ex parte Parks*, the Board reviewed an appeal from a final rejection of claims in a reissue application. The claims under examination recited a method for determining the nitrogen content of a sample and included the step of decomposing the sample in the absence of a catalyst. (*Ex parte Parks* at 1235.) The claims were finally rejected under 35 U.S.C. § 112, first paragraph for lack of adequate descriptive support because the negative limitation “in the absence of a catalyst” had no literal basis in the specification. (*Ex parte Parks* at 1236.) The Board reversed the rejection stating, “Adequate description under the first paragraph of 35 U.S.C. 112 does not require literal support for the invention ... Rather, it is sufficient if the originally-filed disclosure would have conveyed to one having ordinary skill in the art that an appellant had possession of the concept of what is claimed.” (*Ex parte Parks* at 1236.) The Board based their decision on the fact that throughout the discussion “which would seem to cry out for a catalyst if one were used,” no mention was made of a catalyst, and on the fact that one having ordinary skill in the art would have recognized that the decomposition was conducted without a catalyst. (*Ex parte Parks* at 1236.)

The facts in the present case are analogous to those of *Ex parte Parks*. Methods of treating surfaces that include the step of reacting epoxy groups on gas-phase epoxy-functional molecules with surface hydroxyl groups *in situ* in the absence of plasma are described throughout the present application. The use of catalysts is never mentioned. In fact, the application includes six working examples, none of which involve the use of a catalyst. As in *Ex parte Parks*, these examples “would seem to cry out for a catalyst if one were used.” Therefore, based on the originally-filed disclosure, it would be clear to one of ordinary skill in the art that the inventors were in possession of the concept of reacting gas-phase epoxy-

functional molecules with surface hydroxyl groups *in the absence of acid and base catalysts*, as recited in the amended claims.

The reaction of epoxy groups on gas-phase epoxy-functional molecules with surface hydroxyl groups *in situ*, in the absence of plasma and in the absence of acid and base catalysts is not rendered obvious by the prior art. As pointed out in Applicants' previous response, at the time of the invention, the conventional method of reacting epoxy-functional molecules with hydroxyl groups was to conduct the reaction in the presence of water and a catalyst. What's more, the accepted wisdom at the time of the invention was that reactions between epoxy-functional molecules, such as epichlorohydrins and diepoxides, could not take place in the absence of water and acid or base catalysts. The fact that this was the accepted wisdom is illustrated by the teachings of McKelvey *et al.*, *Reactions of Epoxides with Cotton Cellulose in the Presence of Sodium Hydroxide*, *Textile Research Journal*, 29, 918 (1959) ("McKelvey").

McKelvey describes reactions of various epoxides with cotton cellulose in the presence of different concentrations of a sodium hydroxide catalyst. Throughout this article the authors make statements regarding the inability of epoxides to react with the surface hydroxyl groups on cellulose in the absence of catalyst and water. Such statements include the following:

"The authors have been unable to find information in the literature which indicates that an uncatalyzed epoxide acts upon cotton, nor have they been able to bring about such a reaction, in spite of the fact that many epoxy compounds are exceedingly reactive with the functional groups (-OH) contained in cellulose." (Page 918, 1st column, 1st paragraph.)

"The reaction appears to be between alkali treated cellulose and the epoxide, and moisture is essential to the reaction." (Page 918, 2nd column, 2nd full paragraph.)

"No reaction between cotton yarn and the following epoxides in the absence of catalyst occurred either at room temperature or at 95° C for 24 hr.: epichlorohydrin, butadiene diepoxide, styrene oxide, phenyl glycidyl ether and glycidol." (Page 919, 2nd column, 3rd full paragraph.)

"That the reaction under consideration is ionic and catalytic is easily shown by the facts that no reaction between pure epoxides

and cellulose was observed and that when water was extracted from the system, the reaction rate decreased and approached zero as the water was removed completely.” (Page 22, 1st column, 1st full paragraph.)

Although the reactions described by McKelvey were solution-phase reactions, the accepted wisdom that epoxides did not react with surface hydroxyl groups in the absence of water and acid and base catalysts was adopted by those studying gas-phase reactions between epoxides and surface hydroxyl groups. For example, Francis et al., “The Base-Catalyzed Condensation of Cellulosic Fabrics with Volatile Epoxides,” *Textile Research Journal*, **33**, 583 (1963) describes reactions between epichlorohydrin vapor and butadiene diepoxide vapor with cotton and rayon in the presence of various aqueous bases. The authors characterize the reactions as “base-catalyzed condensation reactions” which require the presence of water. (Page 593, 1st column, 3rd full paragraph and page 594, 2nd column, lines 2-4.)

Similarly, G. R. Ferrante, “A Vapor-Phase Epichlorohydrin Process for Wet and Dry Wrinkle Recovery,” *Textile Research Journal*, **35**, 446 (1965) describes reactions between epichlorohydrin vapors and hydroxyl groups on cellulose in the presence of selected acid salt catalysts. The author explicitly adopts the underlying assumptions of McKelvey stating, “McKelvey et al. [7, 8] reported that no reaction occurred between cotton and epichlorohydrin in the absence of a catalyst or in the presence of zinc fluoroborate.” In addition, Ferrante concludes, “water, an active hydroxyl containing material, is necessary to initiate the reaction.” (Page 450, 1st column, 2nd full paragraph.)

The Examiner relies on Musser for the disclosure of a method of reacting hydroxyl groups with epichlorohydrin in the gaseous phase. However, like the references discussed above, Musser requires a base catalyst (i.e., caustic soda) to initiate the gas-phase reaction between epichlorohydrin and hydroxyl groups on a hydroxylated surface. (Column 3, lines 49-52.) Therefore, the Examiner’s own reference in combination with the prior art discussed above, clearly indicates that the accepted wisdom at the time of the present invention was that gas-phase reactions between epoxy groups on epoxy-functional molecules, including epihalohydrins and diepoxides, and surface hydroxyl groups did not occur in the absence of water and an acid or base catalyst. Although these references are fairly old, the Examiner has not identified (and Applicants are not aware of) a single prior art reference that refutes the accepted wisdom laid out in their teachings. The methods of claims 1 and 9 directly contravene this accepted wisdom. Proceeding against accepted wisdom is evidence of non-obviousness. (M.P.E.P. § 2145 X.D.3.) Therefore, Applicants submit that independent

claims 1 and 9 are not obvious in view of the prior art and request that the rejection of these claims be withdrawn.

As a final note, with respect to the relevance of the epichlorohydrin MSDS, Applicants submit that the fact that hydroxyl *radicals* in the air react with epichlorohydrin does not mean that gas-phase epichlorohydrin molecules and surface-bound hydroxyl *groups* will react in the absence of a catalyst. This position is fully supported by the quote from McKelvey that "The authors have been unable to find information in the literature which indicates that an uncatalyzed epoxide acts upon cotton, nor have they been able to bring about such a reaction, in spite of the fact that many epoxy compounds are exceedingly reactive with the functional groups (-OH) contained in cellulose." (Page 918, 1st column, 1st paragraph; emphasis added.) Therefore, even in view of the epichlorohydrin MSDS, the combined teachings of the prior art fail to render claims 1 and 9 obvious.

II. Rejection of Dependent Claims 2-8, 10-17, 34 and 35 Under 35 U.S.C. § 103(a)

Dependent claims 2-8, 10-17, 34 and 35 stand rejected as unpatentable over Wagner in view of Hubbell and Schössler and further in view of various combinations of Laibinis, Musser, the epichlorohydrin MSDS, PCT Application Publication No. WO 01/96452 ("Devoe") and/or U.S. Patent Application Publication No. 2003/0113478 ("Dang"). Applicants respectfully traverse.


Claims 2-8, 10-17, 34 and 35 depend from claim 1 or claim 9. For the reasons discussed in Section I, above, the combined teachings of Wagner, Hubbell, Schössler, Laibinis, Musser and epichlorohydrin MSDS fail to render claims 1 and 9 obvious. Devoe and Dang fail to cure the deficiencies of Wagner, Hubbell, Schössler, Laibinis, Musser and MSDS. Therefore, for at least the reasons discussed in Section I, above, Applicants request that the rejection of claims 2-8, 10-17, 34 and 35 be withdrawn.

III. Provisional Double Patenting Rejections

The Office Action includes several provisional, non-statutory obviousness-type double patenting rejections over co-pending U.S. Patent Application Serial No. 11/609,045 in view of various secondary references. For the reasons presented above, the provisional, non-statutory obviousness-type double patenting rejections should be the only rejections remaining in the present application, which is the earlier filed of the two co-pending applications. Therefore, Applicants request that the Examiner withdraw the provisional double patenting rejection and permit the present application to issue.

The Applicants believe that the pending claims are now in condition for allowance. The Examiner is invited to contact the undersigned should further issues remain. Otherwise, speedy and favorable consideration is respectfully requested. The Director is authorized to charge Deposit Account No. 23-2053 for any fees required for the filing or to credit any overpayment. Any required petition should be considered provisionally made.

Respectfully submitted,



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